manent committee as its center; (9) that in connection with this organization the commitee appoint a local auxiliary council at the capital of each state or territory.

At the conclusion of the discussion of a memoir by Contreras, on the prediction of the seasons for long periods in advance, the congress adopted two resolutions requesting the Director of the Central Meteorological Observatory, Manuel E. Pastrana, to carry out a course of study based upon the ideas of Señor Contreras. Finally the congress recommends to the Mexican observatories their compliance with the resolutions of the international conference at Munich, the adoption of barometric readings reduced to normal gravity for all telegraphic work, and the statement in the published records as to how the values of the correction terms were obtained.—*C. A.*

GRADUATE STUDY AT WASHINGTON.

The Fifteenth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations was held at Washington, D. C., November 12–14, 1901. Simultaneously with this, the Association of State Universities and the Society of Official Horticultural Inspectors held their meetings in Washington, D. C. From the report published editorially in the last number of the Experiment Station Record, Vol. XII, pp. 517–519, we note that several topics of general interest were discussed. President A. W. Harris of the University of Maine, as president of the convention, among other good things said: "If the agricultural college did nothing more than to establish, maintain, and officer the experiment station, it would be justified many times over."

This tribute to the importance of experimentation in agriculture applies equally to meteorology. Many of our own observers have suggested ideas in explanation of observed phenomena, or relative to unknown laws, that are very good as suggestions or hypotheses, but have no value to meteorology until they have been tested, and their truth demonstrated by a proper course of experimentation. Of course such experiments, even if they consist in simply reading a thermometer or rain gage, require time, money, labor, and especially thought. It is much more difficult to establish a new principle than to merely make a series of observations. One must search out every source of error and every chance of mistaken logic; he must even refute other explanations before he is entitled to say that his own is the correct one. All this is the work of the experiment station, whether it be in the field of agriculture or meteorology.

Investigation along new lines of work is, we suppose, especially characteristic of schools of graduate study. Those who have gone through the ordinary scientific school, having attained the degree of bachelor of science, or perhaps even master of science, and thereby shown an extensive knowledge of what is recognized as correct in science, often wish to pursue a further graduate course, and aim for the degree of doctor of philosophy or doctor of science. These degrees are generally attainable in three or four years and should be a guarantee as to the candidate's ability in original research, an assurance that can only be based upon his having actually performed one or more pieces of thoroughly good work in research. For many years past the colleges at the Capital have enjoyed the proud satisfaction of being able to announce in their circulars that by the Act of Congress of April 12, 1892, students are entitled to the use of the libraries and other facilities offered by Government museums and laboratories. These privileges, however important and highly valued, are, however, as nothing compared with the opportunities that ought to be provided for students as such. College laboratories, observatories, and museums must be provided with apparatus and specimens adapted to student use, and the pedagogical business must be the first consideration. It is only when an advanced student actually enters the Government employment and has his daily work assigned him in the museums, laboratories, libraries, observatories, and workshops in Washington that he can truly profit by his opportunities while at the same time pursuing his studies at some one of the universities too numerous to mention in that city.

So great has been the need of good men in the service of the Department of Agriculture, and so difficult is it to meet this need that many have regarded the establishment of a national university at Washington as a necessary future outcome of the present condition of affairs. We have before expressed our opinion that when graduates from scientific schools or land-grant colleges or agricultural colleges or employees of Government experiment stations throughout the land wish to come to Washington to pursue further studies, they can be entered as student assistants in the respective bureaus and do the work necessary to the degree of doctor of philosophy, under a supervisory committee that shall constitute all the organization that the Government need recognize as its university. From this point of view, we are interested in quoting from the above-mentioned editorial in the Experiment Station Record, as follows:

> The committee on graduate study at Washington reported [to the convention] that no progress had been made in securing a bureau in Washington for the administration of graduate work since the last convention. The committee was directed to exhaust every effort to devise a plan whereby graduate study and research in the several departments of the Government may be efficiently organized and directed under Government control, and in the meantime to secure, if practicable, the same opportunities for study and research in other departments of the Government as are at present afforded graduate students in the Department of Agriculture. A resolution was also adopted by the association recording its appreciation of the action of the Government in making available the facilities for research and advanced work in the Department of Agriculture and expressing a desire that these facilities be still further extended and that a national university devoted exclusively to advanced and graduate research be established.

It is evident that such an arrangement would be of the highest advantage to Government work and to the nation. It will not in the least interfere with, but rather stimulate, the State and local colleges if only their holders of the doctor of philosophy degree be admitted to such school.

A paper on agricultural college libraries, by Miss Clark, librarian of the Department of Agriculture, emphasized the great importance of libraries as aids to the work of investigation and instruction. Arrangements are in progress for assisting agricultural colleges in classifying and cataloguing their libraries; only a small proportion are considered to be well organized and administered. The Library of the Department of Agriculture would be able to keep up an index of agricultural literature if an appropriation of at least $2,500 could be secured for the purpose.

The special index to meteorological literature, of which four parts were published by the Signal Office, is not now being kept up by the Weather Bureau. But the great Lehrbuch, or Treatise on Meteorology, just published by Prof. Julius Hann, shows that he must have a very complete index of his own, and his treatise is, therefore, exceedingly useful as a guide to the literature of any branch of the subject.

It was announced that a graduate summer school of agriculture would hold its first session at Columbus, Ohio, during the summer of 1902. Dr. A. C. True, Director of the Office of Experiment Stations, will act as dean of the school, and if the first session proves a success, it will be continued hereafter under the management of a committee of control appointed by the Association of American Agricultural Colleges and Experiment Stations. It will be essentially a school to stimulate and educate those who desire to engage in research. It seems to be generally admitted that there should be some rational combination of the two different subjects, namely, teaching and investigation, in both the colleges and the stations.

A lively discussion followed Mr. W. V. Thompson's paper on the official relation of agricultural colleges and the proposed national university. He believed that this relation should be one of sympathy and cooperation only.

We repeat that by admitting to the privileges of the departments in Washington only holders of the degree of doctor of philosophy or doctor of science—degrees that are obtained by good work in original research—the Government will at once stimulate the colleges and the students and better assure the future progress of science. The progress of arts, navigation, agriculture, meteorology, and every feature of modern civilization depends upon the steady prosecution of research.—*C. A.*

INTERNATIONAL METEOROLOGICAL COMMITTEE.

The Secretary, H. H. Hildebrandsson announces that as a result of a recent ballot the international meteorological committee has decided to meet during the second week of September, 1903, in the city where the British association will hold its sessions.—*H. H. K.*

THE VARIATION OF THE DIURNAL RANGE OF TEMPERATURE WITH THE LATITUDE AND LOCALITY.

A correspondent makes the following inquiry regarding the diurnal range or amplitude of the temperature at different parts of the earth, in the surface layers of the atmosphere:

"On page 37 of Waldo's Elementary Meteorology the following paragraph occurs: 'The amplitude or regular oscillation of the diurnal temperature (or the difference between the extreme maximum and minimum during the twenty-four hours) is, in general, greatest at the equatorial regions and decreases toward the poles, *for the same exposure.*' I have been unable to reconcile the above statement with the general belief in this section [Missouri] that the temperature of the equatorial regions is more nearly constant, and that the maximum temperatures are lower than the maximum temperatures of this latitude during the summer, and the minimum temperatures are higher than the minimum temperatures for this latitude. If this is true, the amplitude of the equatorial regions would appear to be less than for this latitude. An authoritative statement covering the above point is requested."

The above quoted sentence from Waldo is rather vague. Undoubtedly the author had in mind the *average amplitude* of the diurnal temperature oscillation. This is quite different from the *extreme amplitude* which our correspondent evidently has in mind, and which at certain seasons of the year may be greater in Missouri than in the Tropics. The following remarks relate to the average amplitude:

This subject is explained fully in Dr. J. Hann's new Handbook of Meteorology, pages 56–68, and from it the data of this note are extracted. The general law is that the amplitude diminishes from the Tropics to the polar regions, where it disappears, and from the surface of the earth upward, where the diurnal change of temperature vanishes at altitudes of 2,000 or 3,000 meters in the Tropics, and at less altitudes in high latitudes. All comparisons must be divided into two classes, (1) those over the ocean areas, and (2) those over the land areas. The chief cause of difference between these is the greater conductivity of the ground to solar insolation than that of the water, by which the land absorbs heat more rapidly during the day, and cools more quickly during the night, so that the variation of temperature is greater in the ground. This produces a wider amplitude in the temperature of the layers of air in contact with the surface of the land, than is the case with those which touch upon the surface of the ocean. It will not do to compare land amplitudes with ocean amplitudes in the same or in different latitudes, but these two classes of data must be kept entirely separate. The following examples show the range of the amplitude over the ocean in degrees centigrade:

Diurnal amplitude of temperature over the ocean.

	Latitude.	Air or water.	Departure from normal.		Amplitude.
			4 a. m.	2 p. m.	
			°C.	°C.	°C.
Equatorial regions, Atlantic Ocean	0°–10° N.	Water.	−0.31	+0.36	0.67
		Air.	−0.70	+0.81	1.51
North Atlantic Ocean	30° N.	Air.	.....	.....	1.80
South Atlantic Ocean	36° S.	Air.	.....	.....	1.40
North Pacific Ocean	37° N.	Air.	.....	.....	1.70
South Pacific Ocean	36° S.	Air.	.....	.....	2.20
Pacific Ocean (in higher latitudes)	.....	Air.	.....	.....	0.65
North Atlantic Ocean	30° N.	Water.	.....	.....	0.50
Do		Air.	.....	.....	1.70
European North Sea	63–73° N.	Water.	.....	.....	0.37
Do		Air.	.....	.....	0.82

The following examples show the amplitudes over the land areas:

Amplitude in middle Europe.—January, 3.4; February, 4.7; March, 6.6; April, 8.3; May, 8.9; June, 8.5; July, 8.8; August, 8.5; September, 8.3; October, 6.0; November, 3.7; December, 2.8.

Amplitude in northern India.—January, 13.4; February, 14.1; March, 14.8; April, 14.7; May, 12.3; June, 7.9; July, 5.1; August, 4.9; September, 6.9; October, 11.1; November, 13.4; December, 13.5.

Variation of the amplitude in latitude.

Stations.	Latitude.	Amplitude.
	°	°C.
Lady Franklin Bay	81.7	1.4
Ssagastyr	73.4	2.3
Fort Rae	62.6	5.3
Katharinenburg and Bogoslowsk	58.6	6.9
Barnaul	53.3	8.1
Nukuss	42.5	11.8
Lahore	31.6	12.4
Allahabad and Lucknow	26.2	12.1
Nagpur and Jubbulpur	22.1	11.7

In extreme cases the diurnal range may amount to 14°, 16°, or even to 30° centigrade.

Amplitude on mountains and in high valleys for summer months.

Stations.	Height.	Amplitude.
	Meters.	°C.
Chaumont	1130	6.0
b. Gais	1150	2.9
Rigikulm	1790	2.7
Obirgipfel	2140	3.8
Sonnblickgipfel	3106	2.0
Mont Blanc	4359	3.5
Schuls (valley)	1240	9.5
Reckingen (valley)	1350	10.9
Bevers (valley)	1710	10.1

A cloudy atmosphere diminishes the amplitude by a very large amount.

It is seen that the amplitude diminishes with the latitude, and with the altitude; also that the presence of water in large bodies lessens the variation of the diurnal range, and that valleys have a larger amplitude than do the elevated portions of the surface of the earth. As a rule, when the locality, either in its topography, location or constitution, favors the rapid accumulation of heat during the day by its conductivity, and for the same reason quickly gives up its heat at night, there will be a large amplitude. In the polar regions the twenty-four hours are irregularly divided, being all daylight in summer and all darkness in winter, so that there is no contrast in relation to the sun's diurnal radiation, and therefore the amplitude is very small; in the Tropics the day is much more evenly divided, and the resulting effect is greater accession of heat by day and loss by night, with a wide range in amplitude, especially over the land.—*F. H. B.*